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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,306	07/18/2003	Jaeyoung Kwak	I-2-0252.1US	4357

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EXAMINER
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TRAN, KHANH C

ART UNIT	PAPER NUMBER
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2611

DATE MAILED: 11/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/622,306	<b>Applicant(s)</b> KWAK ET AL.	
	<b>Examiner</b> Khanh Tran	<b>Art Unit</b> 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 July 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-9,11-14,16-19 and 21-24 is/are rejected.
- 7) ☒ Claim(s) 5,10,15,20 and 25 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07/18/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 10 is objected to because of the following informalities: in line 3, "menas" should be changed to -- means --. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-2, 6-7, 11-12, 16-17 and 21-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Forsythe et al. U.S. Patent 6,745,050 B1.

Regarding claim 1, in column 5 lines 55-67, Forsythe et al. teaches in FIG. 8 a block diagram of multiuser detection as defined by the present claims for the simple case of one antenna element. Referring to FIG. 8, a first signal 48 corresponding to a user of interest and a second signal 50 from an interfering user appear at an antenna as a summed signal 52. The first signal 48, having a greater magnitude, will cause the second signal 50 to appear as noise in the first signal 48 in the summed signal 52. The

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first signal is demodulated, remodulated, and subtracted from the summed signal 52 to determine the second signal 50 as an output 54.

In column 6 lines 5-50,

FIG. 9 shows multi-channel multiuser detection similar to that described above with respect to the signals of FIG. 8 as applied to a plurality of users. The signals are received over antennas 32a 32b 32c 32d.

For a particular user, as determined by the spreading code corresponding to that user, the signals corresponding to other users appear as interference. As further explained in FIG. 8, a plurality of signals may comprise the summed signal 52 that is actually received. The signal having the greatest magnitude would be determined as the first signal 48, and the remaining signals would remain aggregated as the second signal 50. The signal having the next greatest magnitude is then determined in the same manner, and the second signal 50 remains representative of the aggregation of the remaining signals in the summed signal 52. Hence, the signals are grouped for a particular user.

In column 6 lines 20-50, the signals are then processed via matched filters 62, and a signal decision occurs. If the signals have converged as determined by a predetermined threshold, the demodulated signal is taken to be indicative of a symbol in the intended transmission, and is output as the correct signal decision 64.

The signal is then remodulated 66, and fed back to the nonlinear temporal filter 58 via feedback lines 66a-66c. Note that the remodulated signal carried on the feedback lines 66b-66c received from the detectors 56b-56c corresponding to other users is also

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sent to 58. In this manner, successive detections, described in more detail below, are performed on the received data. For each detector 56 corresponding to a particular user, the signals corresponding to other users are driven towards zero. In view of the forgoing teachings, the signals corresponding to other users are the interfering signals .

Regarding claim 2, as recited in claim 1 rejection, as further explained in FIG. 8, a plurality of signals may comprise the summed signal 52 that is actually received. The signal having the greatest magnitude would be determined as the first signal 48, and the remaining signals would remain aggregated as the second signal 50. Further in column 12 lines 50-60, Forsythe et al. further teaches that the wireless transmissions have a range of received power. In view of that, the summed signal 52 that is actually received is the combined power of each data signal as received by each antenna as claimed.

Regarding claim 6, claim is rejected on the same ground as for claim 1 because of similar scope. Furthermore, Forsythe et al. teachings apply to base station; see column 4 lines 25-45.

Regarding claim 7, claim is rejected on the same ground as for claim 2 because of similar scope.

Regarding claim 11, claim is rejected on the same ground as for claim 1 because of similar scope. FIG. 9 further discloses a reduced dimension estimation subtraction 58.

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Regarding claim 12, claim is rejected on the same ground as for claim 2 because of similar scope.

Regarding claim 16, claim is rejected on the same ground as for claim 1 because of similar scope. FIG. 9 further discloses a reduced dimension estimation subtraction 58.

Regarding claim 17, claim is rejected on the same ground as for claim 2 because of similar scope.

Regarding claim 21, claim is rejected on the same ground as for claim 1 because of similar scope. FIG. 9 further discloses a reduced dimension estimation subtraction 58.

Regarding claim 22, claim is rejected on the same ground as for claim 2 because of similar scope.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3-4, 8-9, 13-14, 18-19 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forsythe et al. U.S. Patent 6,745,050 B1 in view of Klein et al. U.S. Patent 6,212,243 B1.

Regarding claim 3, Forsythe et al. does not teach the jointly detecting data is performed using a zero forcing block linear equalizer as claimed in the application claim.

Klein et al. teaches in another US patent the employment of zero forcing block equalizer (ZF-BLE) for joint detector in CDMA detector for multiuser as disclosed in column 5 lines 40-55. Because zero forcing block equalizer (ZF-BLE) is one of the standard detection algorithms for joint detection in CDMA, one of ordinary skill in the art would have motivated to modify Forsythe et al. teachings to implement the zero forcing block equalizer for demodulating a particular user signal in multi-user environment.

Regarding claim 4, Klein et al. further teaches one of possible detection algorithms including a minimum mean square error block equalizer (MMSE-BLE).

Regarding claim 8, claim is rejected on the same ground as for claim 3 because of similar scope.

Regarding claim 9, claim is rejected on the same ground as for claim 4 because of similar scope.

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Regarding claim 13, claim is rejected on the same ground as for claim 3 because of similar scope.

Regarding claim 14, claim is rejected on the same ground as for claim 4 because of similar scope.

Regarding claim 18, claim is rejected on the same ground as for claim 3 because of similar scope.

Regarding claim 19, claim is rejected on the same ground as for claim 4 because of similar scope.

Regarding claim 23, claim is rejected on the same ground as for claim 3 because of similar scope.

Regarding claim 24, claim is rejected on the same ground as for claim 4 because of similar scope.

***Allowable Subject Matter***



4. Claims 5, 10, 15, 20 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Brunner et al. U.S. Patent 6,301,470 B1 discloses "Radio Communications Receiver And Method Of Recovering Data From Radio Signals".

Elgamal et al. U.S. Patent 6,898,248 B1 discloses "System Employing Threaded Space-Time Architecture For Transporting Symbols And Receivers For Multi-User Detection And Decoding Of Symbols".

Okanoue U.S. Patent 5,202,903 discloses "Noise-Immune Space Diversity Receiver".


6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KCT

 11/24/06

Khanh Tran  
Primary Examiner